Lightweight Airborne Multispectral Minefield Detection (LAMD)

Program Overview

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NDIA Symposium

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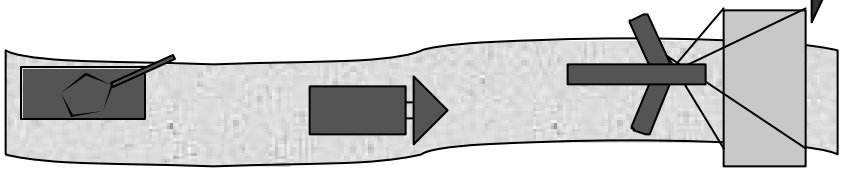
Priority Countermine Requirements

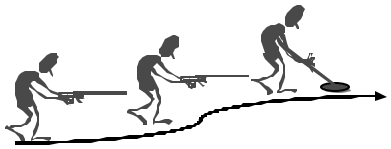
WARFIGHTER COUNTERMINE REQUIREMENTS

MOUNTED FORCES



- **Airborne tactical detection of minefields**
  - **surface and buried mines (priority to surface mines)**
- **Rapid clearance of routes (priority to buried mines)**
- **In-stride breaching of minefields**

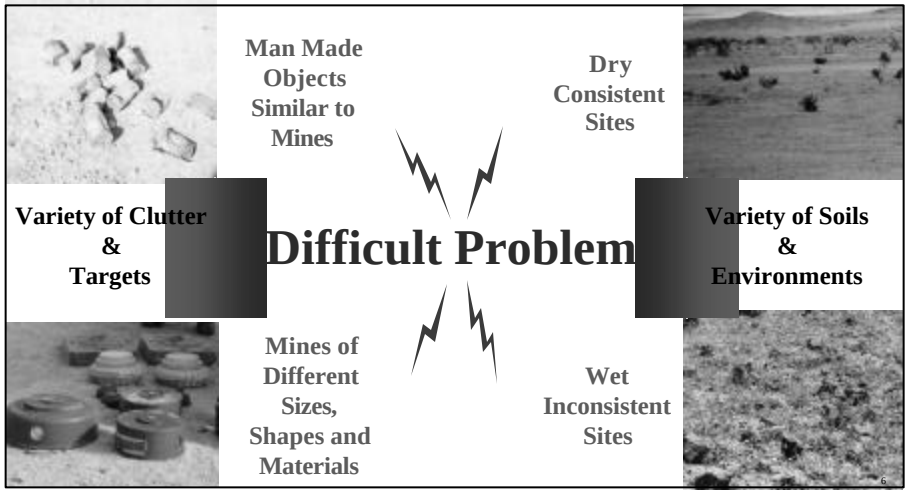
DISMOUNTED FORCES



- **Detection of individual mines on limited access routes/trails/rear areas**
- **Assault Breaching**

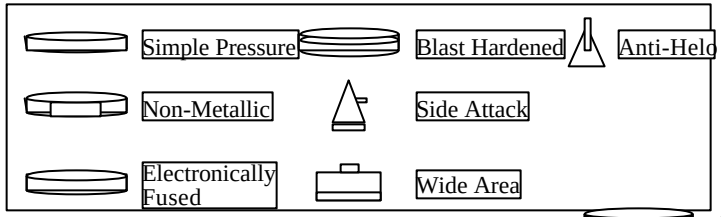
Detection of mines and minefields is the Army's top countermine S&T priority. Breaching addressed by mature (non-S&T) technologies.

Countermine
- A Difficult Technical Challenge -

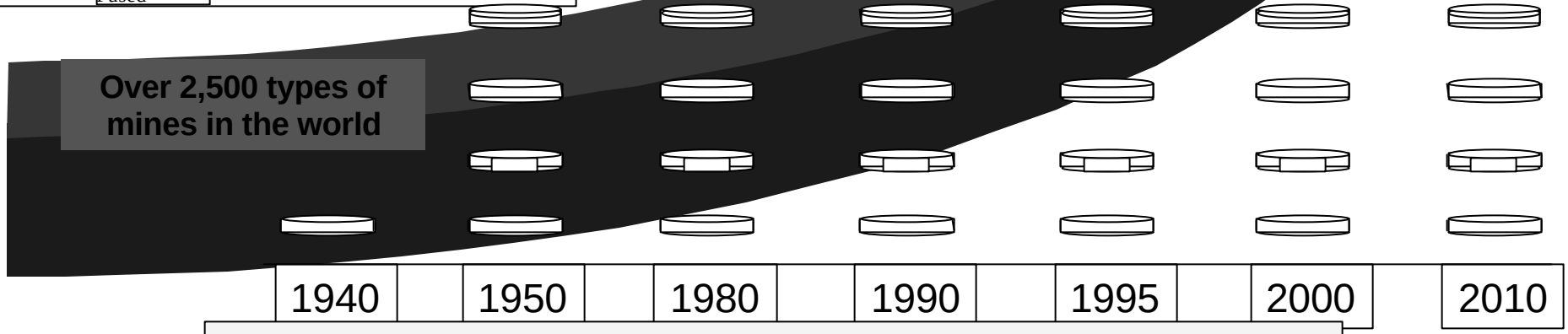


Booby Traps, AP Mines and Unexploded Ordnance Make the Problem Even Worse!

Threat is cumulative!



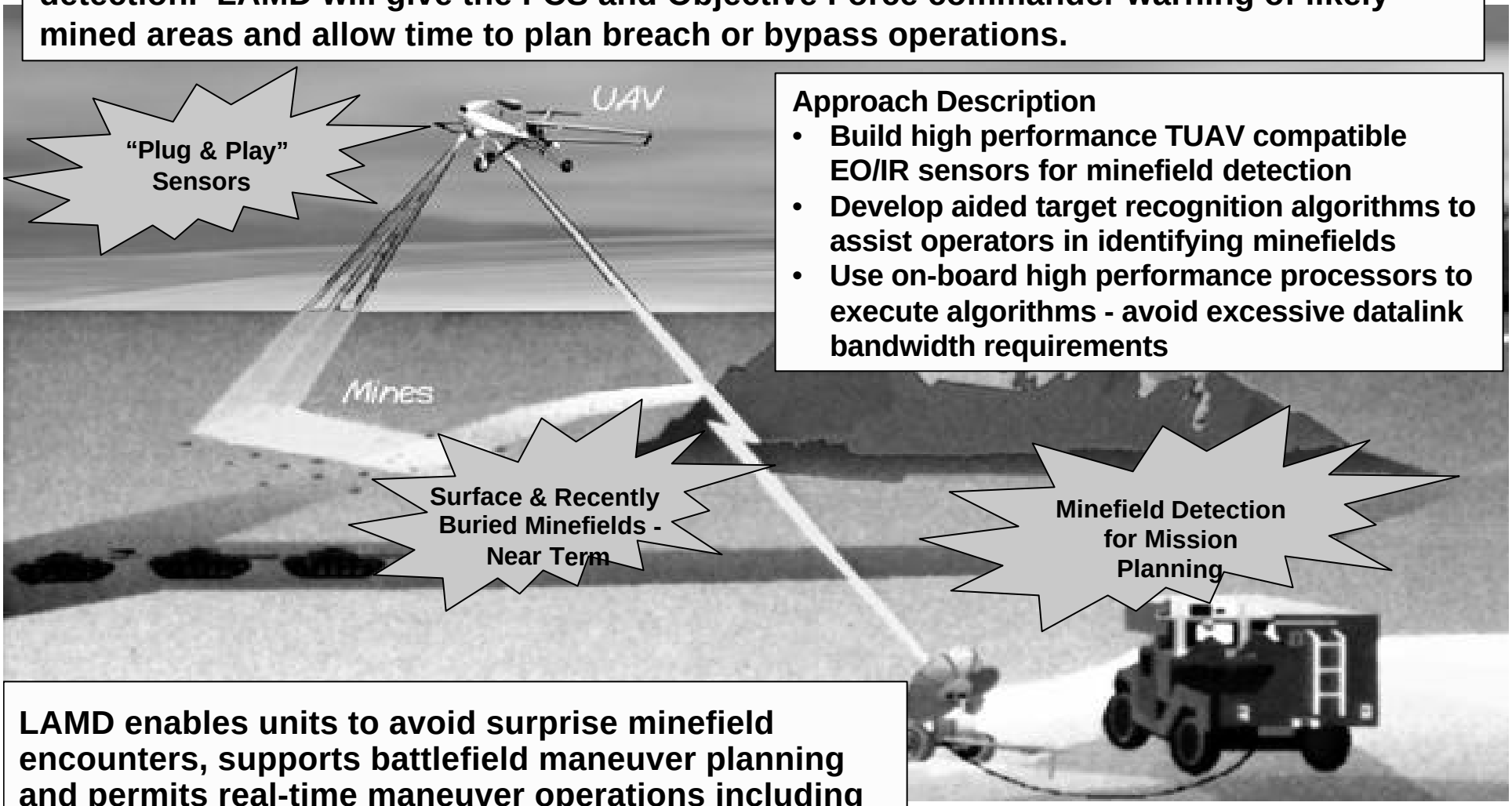
Over 2,500 types of mines in the world



Plastic cases and new fuse technologies are the mine advances that continue to make countermine a significant challenge

Lightweight Airborne Multispectral Minefield Detection (LAMD)

Role of System: LAMD is a TUAV "plug and play" sensor payload for wide area minefield detection. LAMD will give the FCS and Objective Force commander warning of likely mined areas and allow time to plan breach or bypass operations.



Approach Description

- **Build high performance TUAV compatible EO/IR sensors for minefield detection**
- **Develop aided target recognition algorithms to assist operators in identifying minefields**
- **Use on-board high performance processors to execute algorithms - avoid excessive datalink bandwidth requirements**

LAMD enables units to avoid surprise minefield encounters, supports battlefield maneuver planning and permits real-time maneuver operations including breach/bypass decisions prior to minefield encounter.

Technical Performance Objectives

Operational Capability/Parameter	Exit Criteria	
	Minimum	Goal
Probability of Detection		
– surface patterned minefields	80%	*95%
– buried patterned minefields	65%	*80%
– surface scatterable minefields	70%	*85%
– buried nuisance mines on unpaved roads	60%	*75%
False Alarm Rate		
– false detections / square kilometer of area covered	FAR < 0.5	*FAR < 0.5
Detection Accuracy		
– minefield edge	< 150 m	< 100m
– minefield boundary	n/a	< 150m
Sensor Weight	< 65 lbs.	< 35 lbs.

* PD and FAR goals during defined operational conditions (i.e. time of day, environment, etc.). Conditions to be defined at the conclusion of the phenomenology investigations.

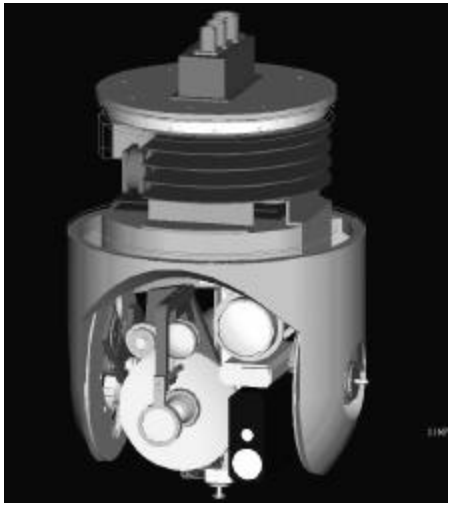
LAMD Objectives - FY00-03

- **Demonstrate / (determine) how useful a minor modification to the EO/IR TUAV reconnaissance payload can be in minefield detection for both surface and buried minefields**
  - **filter wheel on MWIR**
- **Demonstrate a TUAV compatible laser system for surface minefields**
  - **detailed design for a TUAV compatible payload**
  - **Laser diode array + gated camera and lower resolution (~2 in) LWIR confirmer - growth to multispectrial LWIR for buried on roads**
- **Pursue Technology Investigation for Buried Minefield Detection**

LAMD TUAV Payload Strategy

-Two minefield detection products-

Non-interfering Modification to Advanced TUAV EOIR Sensor

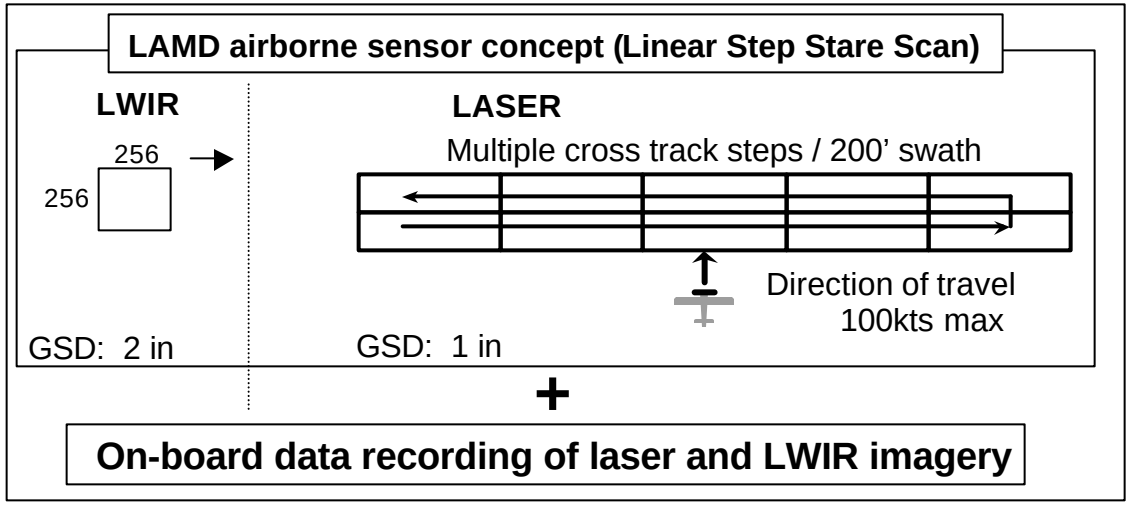


Demonstrate useful minor modification to the EO/IR TUAV reconnaissance payload for both the detection of <u>surface and buried minefields</u> (at optimum time of day)

- **filter wheel on MWIR**
- **EO camera (+ possible modification to l off line)**

and

High Perf Stand-off Minefield Detection Payload Active Laser + Passive LWIR to Confirm Scatterable mines



Demonstrate a TUAV compatible laser system for high confidence detection of <u>surface minefields</u> (highest user priority since takes no time to deploy)

- **detailed design for a <50lb payload**
- **functional demonstration**
- **808 nm laser diode array + gated camera and lower resolution (~2 in) LWIR - growth to multispectral LWIR for buried on roads**

LAMD TUAV Payload Development Summary

- **Two approaches will be developed and demonstrated under the LAMD Program**
  - **modified TUAV EO/IR system will be demonstrated Aug-Dec 01**
  - **laser/LWIR system will be demonstrated Aug-Dec 02**
- **Technology transition to PDRR planned for FY03**

LAMD is developing airborne minefield detection technology to support FCS and Objective Force mobility and survivability - avoid surprise and maintain tempo